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ABSTRACT (57):

A procedure for the assignment of telecommunication services of a telecommunication network to at least one participating station (5, 10, 15, 20) of the telecommunication network is proposed which permits a more flexible utilization of the telecommunication services by the participating stations (5, 10, 15, 20). Information signals are transmitted to the at least one participating station (5, 10, 15, 20), wherein such information signals contain information as to which of the telecommunication services are assigned for use by the at least one participating station (5, 10, 15, 20). The telecommunication services of the at least one participating station (5, 10, 15, 20) can be assigned depending on the message traffic in the telecommunication network.

Description

State of the Art

[0001] This present invention concerns a procedure for the assignment of telecommunication services of the type specified in the main claim.

[0002] The GSM specification (Global System for Mobile Communications) 02.11, version 4.9.0, describes how to assign user classes to mobile stations. The user classes randomly divide the number of mobile stations into ten classes. A base station can then grant or deny authorization for each of these classes to send request messages on a freely selectable access channel. Whether the authorization has been granted or rejected is communicated to the mobile stations via a signaling channel.

Advantages of this Present Invention

[0003] By comparison, the procedure in accordance with this present invention as specified in the main claim hereof is advantageous insofar as information signals are transmitted to the at least one participating station wherein such information signals contain information as to which of the telecommunication services have been assigned for use by the at least one participating station. This permits a more flexible assignment of telecommunication services to the at least one participating station. Such more flexible assignment of telecommunication services not only makes it possible to assign all telecommunication services or no telecommunication service at all to the at least one participating station, but also to assign part of available telecommunication services to the at least one participating station. Telecommunication network resources can therefore be made available to the participating stations of the telecommunication network in a more efficient manner, as a result of which certain telecommunication services can be made available to the at least one participating station for a longer period of time.

[0004] The measures listed in the subclaims permit advantageous refinements and improvements of the procedure specified in the main claim.

[0005] It is advantageous that different telecommunication services are assigned to the at least one participating station at different times. In this manner, the resources of the telecommunication network can be dynamically assigned in an even more effect and flexible manner for use by the at least one participating station.

[0006] It is particularly advantageous to assign the telecommunication services to the at least one participating station depending on message traffic in the telecommunication network. In this manner, even in the case of high message traffic volume in the telecommunication network, certain telecommunication services can be made available for a longer period of time to the at least one participating station by specifically prohibiting other telecommunication services.

[0007] The procedure for the assignment of telecommunication services and, consequently, resources of the telecommunication network is further rendered more flexible in an advantageous manner by classifying the participating stations into user classes, wherein the telecommunication services are assigned to the participating stations depending on their user class.

[0008] Another advantage is that the at least one participating station receives information, through the information signals, preferably by means of a bit pattern, on which telecommunication service or which combination of telecommunication services from a specified set of at least one telecommunication service and/or at least one combination of telecommunication services is assigned to the at least one participating station. In this manner, the information signals require a minimum data volume and, therefore, less time for transmission at the same data rate, or a lower data rate at the same transmission time.

Drawing

[0009] Sample embodiments of this present invention are illustrated in the drawing and explained in more detailed in the description below. Figure 1 shows a section of a telecommunication network, Figure 2 shows a first bit pattern for the assignment of telecommunication services, and Figure 3 shows a second bit pattern for the assignment of telecommunication services.

Description of the Sample Embodiments

[0010] In Figure 1, the reference number 100 indicates a base station of a telecommunication network, which is provided in the form of a mobile radio network. Such a mobile radio network usually has a cellular design, wherein each radio cell of the mobile radio network is supplied by a base station. The base station 100 therefore creates a radio cell in the mobile radio network, wherein, as shown in Figure 1, a first participating station 5, a second participating station 10, a third participating station 15, and a fourth participating station 20 are disposed. The four participating stations 5, 10, 15, and, 20 are sample mobile stations, for example mobile phones, radio phones, or the like. In the sample embodiments described herein, the first participating station 5 is a first mobile station, the second participating station 10 a second mobile station, the third participating station 15 a third mobile station, and the fourth participating station 20 a fourth mobile station. A network operator of the mobile radio network offers a prespecified set of telecommunication services. For the following description, for illustration purposes, the network operator will be able to offer three different types of telecommunication services. As a first telecommunication service, for example, a data access service can be provided which can be used by the mobile stations 5, 10, 15, 20 to transmit short data bursts to the base station 100 via a freely selectable access channel 30, which shall hereinafter, for illustration purposes, be a RACH (Random Access Channel). As a second telecommunication service, for example, a capacity request service may be provided where the RACH 30 may be used by the mobile stations 5, 10, 15, 20 to request separate data channels for data transmission. As a third telecommunication service, for example, a voice call service may be provided where the RACH 30 can be used by the mobile stations 5, 10, 15, 20 to initiate or continue voice transmissions. The three telecommunication services can be assigned individually and/or in any desired combination to the mobile stations 5, 10, 15, 20 by the network operator.

[0011] The telecommunication services must be requested from the network operator by the respective mobile station via the base station 100. The telecommunication services are made available via the RACH 30 to the mobile stations 5, 10, 15, 20. Usually, via the RACH 30, messages can be sent by several mobile stations to the base station 100. In this manner, messages of different mobile stations may collide. The base station 100 therefore acknowledges

any messages that have been properly received by sending back corresponding acknowledgement or receipt information via another channel (not shown in Figure 1), for example a paging channel, to the mobile stations whose messages have been properly received. The telecommunication services are usually requested by the mobile stations 5, 10, 15, 20 or made available via the RACH 30.

[0012] In the event that a message by a mobile station collides with another message on the RACH 30, this message will not be properly received in the base station 100, as a result of which the base station 100 will also be unable to send back any acknowledgment information to the corresponding mobile station. The mobile station therefore resends the message, after a specified period of time during which no acknowledgment information has been received from the base station 100, via the RACH 30 to the base station 100. As a result, there is a risk of overloading the RACH 30, which therefore limits the user-initiated requesting of telecommunication services by the respective mobile stations due to its limited transmission capacity.

[0013] Overloading the RACH 30 can be prevented by the network operator by specifically restricting the use of telecommunication services by the individual mobile stations 5, 10, 15, 20 via the RACH 30. Individual telecommunication services, for example, may only be made available on a preferential basis for certain user classes, both on a temporary or permanent basis. According to the sample embodiments shown in Figure 1, a first user class 35 is defined which comprises the first mobile station 5 and the second mobile station 10. Furthermore, a second user class 40 is defined which comprises the third mobile station 15 and the fourth mobile station 20. However, it is also possible to define a separate user class for each mobile station. It is also conceivable to define user classes with a different number of mobile stations. It is furthermore possible to provide more than two mobile stations in a user class. The network operator can then assign the telecommunication services to the individual mobile stations depending on whether they belong to one of the two user classes 35, 40. This means that, to the two mobile stations 5, 10 of the first user class 35, the same telecommunication services are assigned by the network operator. Accordingly, to the mobile stations 15, 20 of the second user class 40, the same telecommunication services are also assigned. The telecommunication services assigned to mobile stations 5, 10 of the first user class 35 can differ from the telecommunication services assigned to the mobile stations 15, 20 of the second user class 40. The telecommunication services assigned to the mobile stations of the two user classes 35, 40, however, may also be the same. The network operator notifies the individual mobile stations 5, 10, 15, 20 by means of information signals, which are transmitted from the base station 100 to the respective mobile station 5, 10, 15, 20, which of telecommunication services of the network operator are assigned to the respective mobile station 5, 10, 15, 20. As an example which applies to all mobile stations 5, 10, 15, 20, please refer to the following description of the assignment of telecommunication services of the network operator to the first mobile station 5 shown in Figure 1.

[0014] At specified times, the base station 100 transmits signals to the first mobile station 5. The information signals can be transmitted, as shown in Figure 1, via a signaling channel 25, which, for example, may be a broadcast control channel BCCH, as is the case in this present example. The information signals are used to transmit, at the specified times, one bit pattern each to the first mobile station 5. In a first embodiment hereof, the bit pattern may contain information as to

which telecommunication service and/or which combination of telecommunication services from a specified set of telecommunication services are assigned to the first mobile station 5. The specified set of telecommunication services refers to the telecommunication services already described above, such as data access service, capacity request service, and voice call service. Since the bit pattern is not only sent to the first mobile station 5, but also to all other mobile stations 10, 15, 20, once again via the signaling channel 25 which, as described, is provided in the form of a BCCH and therefore as a point-to-multipoint channel, as a result of which all mobile stations receive the same information at the same time, to inform them of which telecommunication services have been assigned to them, the bit pattern comprises the assigned telecommunication services for each user class 35, 40. The associated bit pattern is shown in Figure 2 and indicated by the reference number 45. It comprises a first bit pattern section 105 for the first user class 35 and a second bit pattern section 110 for the second user class 40. Both bit pattern sections 105, 110 comprises three bits each. A first bit 51 of the first bit pattern section 105 of the first bit pattern 45 specifies whether the data access service has been assigned to the mobile stations 5, 10 of the first user class 35. A second bit 52 of the first bit pattern section 105 of the first bit pattern 45 specifies whether the capacity request service has been assigned to the mobile stations 5, 10 of the first user class 35. A third bit 53 of the first bit pattern section 105 of the first bit pattern 45 specifies whether the voice call service has been assigned to the mobile stations 5, 10 of the first user class 35. A first bit 61 of the second bit pattern section 110 of the first bit pattern 45 specifies whether the data access service has been assigned to the mobile stations 15, 20 of the second user class 40. A second bit 62 of the second bit pattern section 110 of the first bit pattern 45 specifies whether the capacity request service has been assigned to the mobile stations 15, 20 of the second user class 40. A third bit 63 of the second bit pattern section 110 of the first bit pattern 45 specifies whether to the mobile stations 15, 20 of the second user class 40, the voice call service has been assigned. A logic one of the respective bits specifies that the respective telecommunication service has been assigned to the respective mobile stations, and a logic zero indicates that the respective telecommunication service has not been assigned to the respective mobile stations. As shown in Figure 2, in the first bit pattern section 105 of the first bit pattern 45, the first bit 51 and the second bit 52 are set to one, and the third bit 53 is set to zero. This means that to the mobile stations 5, 10 of the first user class 35, the data access service and the capacity request service as well as the combination of the two services has been assigned. The voice call service, however, has not been assigned to the mobile stations 5, 10 of the first user class 35. In the second bit pattern section 110 of the first bit pattern 45, the first bit 61, the second bit 62, and the third bit 63 are each set to one. This means that all three telecommunication services as well as all possible combinations of two or three telecommunication services are assigned to the mobile stations 15, 20 of the second user class 40. By means of an access authorization card inserted by the user of the respective mobile station into the mobile station, where which the user class of the mobile station is stored on such access card, the mobile station detects that it belongs to the respective user class and can therefore specifically access the associated bit pattern section of the respective bit pattern to detect telecommunication services and/or combinations of telecommunication services that have been assigned to it for this user class. The assigned telecommunication services can then use the corresponding mobile station via the RACH 30, as shown in Figure 1 for the first mobile station 5, which transmits messages for the use of the telecommunication services assigned via the RACH 30 to the base station 100. As shown in Figure 2, for each user class, three bits are required to notify, in case the number of

three telecommunication services is three, the respective mobile station which of the three telecommunication services has been assigned to it, whether individually or in any desired combination. For two user classes, the length of the first bit pattern 45 is therefore 2 x 3 = 6 bits. Generally speaking, the length of the first bit pattern 45 can be calculated by multiplying the number of user classes by the number of possible telecommunication services.

[0015] In the event that a bit pattern section of the first bit pattern 45 contains more than a single bit that has been set to one, only the associated telecommunication service has been assigned to the respective mobile station, and any combinations with the other telecommunication services are not possible, considering that their bits have been set to Zero.

[0016] Another sample embodiment for generating a bit pattern for the assignment of telecommunication services to a mobile station is shown in Figure 3. The information signals that are transmitted via the signaling channel 25 comprise a second bit pattern 50 which communicates to the first mobile station 5 which telecommunication service or which combination of telecommunication services from a specified set of at least one telecommunication service and/or at least one combination of telecommunication services are assigned to the first mobile station 5. Telecommunication services or combinations of telecommunication services are assigned to the other mobile stations 10, 15, 20 accordingly. To all mobile stations 5, 10, 15, 20, a second bit pattern 50 each comprising a first bit pattern section 115 for the first user class 35 and a second bit pattern section 120 for the second user class 40 is transmitted via a signaling channel. The first mobile station 5 and the second mobile station 10 therefore receive information on which telecommunication services have been assigned to them by analyzing the first bit pattern section 115 of the second bit pattern 50, and the third mobile station 15 and the fourth mobile station 20 receive information on which telecommunication services have been assigned to them by analyzing the second bit pattern section 120 of the second bit pattern 50. The first bit pattern section 115 of the second bit pattern 50 comprises a first bit 71 and a second bit 72. The second bit pattern section 120 of the second bit pattern 50 also comprises a first bit 81 and a second bit 82. As shown in Figure 3, the first bit 71 of the first bit pattern section 115 of the second bit pattern 50 has been set to zero, and the second bit 72 of the first bit pattern section 115 of the second bit pattern 50 has been set to one. The first bit 81 of the second bit pattern section 120 of the second bit pattern 50 has been set to one, and the second bit 82 of the second bit pattern section 120 of the second bit pattern 50 has been set to zero.

[0017] According to the second sample embodiment, a set of one telecommunication service and two combinations of telecommunication services is to be assigned to the mobile stations 5, 10, 15, 20. In the sample embodiment described, this set comprises the voice call service as a first element of the set, the combination of the voice call service and the capacity request service as a second element of the set, and the combination of the voice call service, the capacity request service and the data access service as a third element of the set. Only one element each of the set can be assigned to the respective mobile station. The number of this element of the set is represented in binary form by the two bits of the respective bit pattern section of the second bit pattern 50. According to the sample embodiment shown in Figure 3, to the mobile stations 5, 10 of the first user class 35, based on the bit combination 0-1 in the first bit pattern section 115 of the second bit pattern 50, i.e. a binary one, the first element of the set is assigned, i.e. only the voice call service. To the mobile stations 15, 20 of the second user

class 40, however, based on the bit combination 1-0 in the first bit pattern section 115 of the second bit pattern 50, i.e. a binary two, the second element of the set, i.e. both the voice call service as well as the capacity request service is assigned for use. To the set, a fourth set element with the bit combination 0-0 could be added without requiring an increase in the number of bits per bit pattern section. For a set with a maximum of four set elements, for each user class, two bits are required to represent the assigned element of the set, as a result of which, in the second sample embodiment shown in Figure 3, for two user classes, the length of the second bit pattern 50 is 2 x 2 = 4 bits. Generally speaking, the length of the second bit pattern 50 in accordance with the second sample embodiment can be calculated by multiplying the number of user classes and the base-2 logarithm of the number of set elements rounded off to the next higher integer.

[0018] The information signals are transmitted from the base station 100 to the mobile stations 5, 10, 15, 20 at specified times, preferably in regular intervals. The network operator can assign telecommunication services depending on message traffic in the telecommunication network and, consequently, depending on the expected utilization of the RACH 30, to the individual mobile stations 5, 10, 15, 20 depending on their user class and therefore assign certain telecommunication services to a certain user class or certain user classes on a preferential basis, whether temporarily or permanently. Since message traffic in the telecommunication network changes over time, the expected utilization of the RACH 30 also changes with time, as a result of which, usually, at different times, different telecommunication services can be assigned to the mobile stations 5, 10, 15, 20 by changing the bit pattern assignment accordingly. The case, known from GSM specification 02.11, version 4.9.0, where all telecommunication services are assigned or, alternatively, no telecommunication service is assigned to the respective mobile stations 5, 10, 15, 20, represents a special case of the procedure in accordance with this present invention. In case all telecommunication services are assigned to a user class, in accordance with the sample embodiment shown in Figure 2, all bits of the associated bit pattern section are set to one. In case no telecommunication service is assigned to the mobile stations of a user class, in accordance with the sample embodiment shown in Figure2, all bits of the associated bit pattern section are set to zero.

[0019] Traffic on the RACH 30 can be additionally relieved by providing a repeat counter and/or a repeat interval. The repeat counter specifies the maximum number of permitted attempts for repeating the transmission of a message by the respective mobile station via the RACH 30 to the base station 100 in the event of any collision of the message with that sent by another mobile station. The repeat interval is a stochastic measure for the time interval that elapses until the next message is sent by the respective mobile station to the base station 100 by using the RACH 30. The smaller the number of permitted repeat attempts and the larger the repeat interval, the higher the extent to which traffic on the RACH 30 is relieved. In regular intervals, the repeat counter and/or the repeat interval can be communicated, together with the bit pattern of the telecommunication services that have been assigned, to the respective mobile stations, if necessary together with other radio cell-specific information, via the associated signaling channel 25.

[0020] The procedure in accordance with this present invention can be implemented in a mobile radio network as per UMTS standard (Universal Mobile Telecommunication System), GSM standard, or the like.

[0021] The procedure in accordance with this present invention is not limited to use in a mobile radio network, but can be used in general in telecommunication networks for the assignment of telecommunication services to participating stations of the telecommunication network, and the telecommunication network may, for example, also be a wired, land-based network.

Claims

1. A procedure for the assignment of telecommunication services of a telecommunication network to at least one participating station (5, 10, 15, 20) of the telecommunication network, characterized in that information signals are transmitted to the at least one participating station (5, 10, 15, 20), wherein such information signals contain information on, which telecommunication services have been assigned for use by the at least one participating station (5, 10, 15, 20).

2. A procedure in accordance with Claim 1, characterized in that the information signals are transmitted at specified times to the at least one participating station (5, 10, 15, 20).

3. A procedure in accordance with Claim 1 or 2, characterized in that, at different times, different telecommunication services are assigned to the at least one participating station (5, 10, 15, 20).

4. A procedure in accordance with Claim 1, 2 or 3, characterized in that the telecommunication services are assigned to the at least one participating station (5, 10, 15, 20) depending on the message traffic volume in the telecommunication network.

5. A procedure in accordance with one of the preceding Claims, characterized in that the at least one participating station (5, 10, 15, 20) is assigned to a user class (35, 40) and that the telecommunication services are assigned to the at least one participating station (5, 10, 15, 20) depending on its user class (35, 40).

6. A procedure in accordance with one of the preceding Claims, characterized in that the telecommunication services are at least partially made available via a freely selectable access channel (30) to the at least one participating station (5, 10, 15, 20).

7. A procedure in accordance with one of the preceding Claims, characterized in that the information signals are transmitted via at least one signaling channel (25) to the at least one participating station (5, 10, 15, 20).

8. A procedure in accordance with one of the preceding Claims, characterized in that, to the at least one participating station (5, 10, 15, 20), the information signals communicate, preferably by means of a bit pattern (45, 50), which telecommunication service and/or which combination of telecommunication services from a specified set of telecommunication services is/are assigned to the at least one participating station (5, 10, 15, 20).

9. A procedure in accordance with one of the preceding Claims, characterized in that, to the at least one participating station (5, 10, 15, 20), the information signals communicate, preferably by means of a bit pattern (45, 50), which telecommunication service and/or which combination of telecommunication services from a specified set of at least one telecommunication service and/or at least one combination of telecommunication services is/are assigned to the at least one participating station (5, 10, 15, 20).